

### REMARKS

The non-final Office Action mailed September 7, 2004, has been reviewed and carefully considered. Claims 1-41 are pending in the application. Claims 1-41 were rejected. Claims 1, 14, 17, 27, 30 and 38-41 are amended.

In paragraph 2, on page 2 of the Office Action, claim 14 was rejected under 35 U.S.C. § 112, first paragraph.

In paragraph 4, on page 3 of the Office Action, claim 14 was rejected under 35 U.S.C. § 112, second paragraph.

Applicant respectfully traverses the § 112 rejections.

Applicant has amended claims 14 and 27 and the specification and submits that the amendments to the claims and specification do not narrow or change the scope of the application.

Applicant submits that to one skilled in the art the language “3 to about 6 Å” would be viewed as a unit of measurement Å because of the context the language is in and the context of the application at hand. For example the following U.S. patents each discuss magnetic tunnel junctions and angstroms 6,703,654, 6,730,395, 6,518,588, 6,452,240, 6,452,892, 6,226,160, 6,166,948, 6,103,406.

Applicant has also amended claims 1, 17, 30 and 38-41. Applicant submits that the amendments to the claims do not narrow or change the scope of the invention.

In paragraph 6, on page 3 of the Office Action, claims 1-8, 10 and 12-16 were rejected under 35 U.S.C. § 103(a) over Hiramoto et al. (U.S. Patent Application Publication No. 2003/0017723)

In paragraph 11, on page 7 of the Office Action, claims 17-26, 28-37 and 39-41 are rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Gill (U.S. Patent No. 6,097,579).

In paragraph 17, on page 9 of the Office Action, claim 18 was rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Gallagher et al. (U.S. Patent No. 5,640,343).

In paragraph 22, on page 9 of the Office Action, claim 9 was rejected under 35 U.S.C. § 103(a) over Hiramoto as applied to claims 1-8, 10 and 12-16, and further in view of Slaughter et al. (U.S. Patent Application Publication No. 2004/0041183).

In paragraph 27, on page 10 of the Office Action, claim 11 was rejected under 35 U.S.C. § 103(a) over Hiramoto as Modified by Slaughter as applied to claim 9 above, and in further view of Makino et al. (U.S. Patent No. 6,449,133).

Applicant respectfully traverses the § 103(a) rejections. Applicant respectfully asserts that the requirements are not present and a *prima facie* rejection fails under 35 U.S.C. § 103(a) because the Office Action fails to cite a reference or references that teach, disclose or suggest all the claim limitations of Applicant's application.

The instant application focuses on a magnetic tunnel junction (MTJ) device that includes "a first magnetic layer and a second magnetic layer, at least one of the first and the second magnetic layers configured to include diffusion components selected to adjust one or more properties of the tunnel junction device; and a barrier layer disposed between the first and the second magnetic layers comprising diffusion components from the at least one magnetic layer, wherein the diffusion components adjust the one or more properties of the tunnel junction device."

More particularly, the instant application requires "a first magnetic layer and a second magnetic layer, at least one of the first and the second magnetic layers configured to include diffusion components selected to adjust one or more properties of the tunnel junction device."

Hiramoto, merely teaches first magnetic layer 12, second magnetic layer 14 with high-resistivity layer 13 disposed therebetween. See paragraphs 0067 and 0068, for example. Hiramoto fails to discuss diffusion components in the first and second magnetic layers. Instead "magnetic layers include at least one metal element M selected from Fe, Ni and Co." See paragraph 0066. "[A]nd it is preferable that the element  $R_{CP}$  is included in these materials." Paragraph 0066. Where  $R_{CP}$  can be Si, Ge, Al Ga, Cr, V, Nb, Ta, Ti, Zr, Hf, Mg or Ca. Paragraph 0073.

Hiramoto does not discuss including diffusion components with the magnetic layers anywhere. Therefore, Hiramoto fails to disclose, teach or suggest "a first magnetic layer and a

second magnetic layer, at least one of the first and the second magnetic layers configured to include diffusion components selected to adjust one or more properties of the tunnel junction device.”

Furthermore, the instant application requires “diffusion components from the at least one magnetic layer, wherein the diffusion components adjust the one or more properties of the tunnel junction device.” Thus, it is the diffusion components that adjust the properties of the MTJ device.

In Hiramoto it is taught that “oxidation and nitriding of the metal element M resulting in spin inversion can be inhibited” when “a current is passed so that the first magnetic layer is positive and the second magnetic layer is negative. Accordingly, diffusion of oxygen ions is inhibited when a current is applied, so that the life of the device can be extended.” *See* paragraph 0018. Electron diffusion in Hiramoto does not adjust one or more properties of the MTJ device. Rather, electron diffusion is a property that is controlled by the direction the current applied to the magnetic layers which inhibits spin inversion.

Therefore, Hiramoto fails to disclose, teach or suggest “diffusion components from the at least one magnetic layer, wherein the diffusion components adjust the one or more properties of the tunnel junction device.”

Applicant submits that the § 103(a) rejection should be removed because the Office Action does not provide a reason why one would modify Hiramoto. Only broad conclusory statements have been made regarding the use of Hiramoto for forming an MTJ device without providing evidence of motivation of why one skilled in the art would have been motivated to modify Hiramoto to arrive at the presently claimed invention. Furthermore, Applicant has reviewed Hiramoto and cannot find a teaching, disclosure or suggestion for modifying the reference to achieve the claimed limitations. The MPEP indicates that evidence of the reasons one of ordinary skill in the art would have been motivated to select the references and combine them should be specifically identified and shown by some objective teaching in the prior art leading to the modification. *See* MPEP § 2106. In the present instance, the Office Action has neither indicated reasons why one skilled in the art would be motivated to modify Hiramoto, nor provided any evidence of factual teachings, suggestions or incentives from the prior art that lead

to the modification. Therefore, Appellant submits that the § 103(a) rejection is improper and should be removed.

Moreover, with respect to the § 103(a) rejections, the alleged motivations for making the asserted combinations are improper for being conclusory and lacking supporting evidence. According to MPEP § 2143.01, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” The alleged motivation for making the Hiramoto-Gill combination is “in Hiramoto that the TMR device is suitable for use as a MR sensor, and the teaching in Gill that a current source and a detector are essential elements of a TMJ sensor, and that such a sensor is appropriately attached to an actuator arm and suspended over a movable recording medium so as to form a sensor device,” merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

Similarly, the Hiramoto-Gallagher combination motivation “in view of the teaching in Hiramoto that the TMR sensors can be utilized in forming a MRAM device, and the teaching in Gallagher that an MRAM device can be formed by an array of interconnected TMJ sensors,” merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

The Hiramoto-Slaughter combination motivation “in view of the teaching in Hiramoto that CoFeHf alloys are suitable for use in forming the magnetic layers of a TMR device, and teaching in Slaughter that a CoFeHf alloy containing 5 atomic % HF is especially suited for forming a magnetic alloy utilized in a MTJ,” merely indicates the references can be combined, but the suggestion of the desirability of the combination is lacking. Therefore, the alleged motivation is improper.

The Hiramoto-Slaughter-Makino combination is improper for the reason stated above relating to the Hiramoto-Slaughter combination.

Because the combination of Hiramoto with Gill, Gallagher, Slaughter and/or Makino fails to teach, disclose or suggest all the elements of at least the independent claims, the § 103(a) rejections are improper and should be withdrawn.


Dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 are also patentable over the cited reference, because they incorporate all of the limitations of the corresponding independent claims 1, 17 and 30. Further dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 recite additional novel elements and limitations. Applicant reserves the right to argue independently the patentability of these additional novel aspects. Therefore, Applicant respectfully submits that dependent claims 2-13, 15-16, 18-26, 28-29 and 31-37 are patentable over the cited references, and request that the objections to the independent claims be withdrawn.

On the basis of the above amendments and remarks, it is respectfully submitted that the claims are in immediate condition for allowance. Accordingly, reconsideration of this application and its allowance are requested. Please charge/credit Deposit Account No. 50-0996 (HITG.037PA) for any deficiencies/overpayments.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Attorney for Applicant, David W. Lynch, at 651-686-6633 Ext. 116.

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Respectfully submitted,

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